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″Calcicgypsisalids″ as a New Sub Great Group in American Taxonomy in Central Iran Soils

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ABSTRACT

Knowing soil types and their features is a great help to determine the limitations, potentials, and in turn a better exploitation of them. After a geomorphic disintegration of the selected lands which was done to recognize the soil types and their level of fertility in Hasan Abad (a region in Isfahan), about 120 profile which were dug as much as 500 to 1000 meters deep were chosen. The morphological features pertaining to soil genetic layers and hydrological evidence were all prepared. Having calculated the size of the texture, the electrical conductivity processes (EC) and PH were identified in soil genetic layers. All chemical and physical analysis and classification were done on the target samples using American Taxonomy. Based on these classifications, two types of soil (Entisols and Aridisols) were both identified. 9 different series were also determined. Having analyzed the data, it turned out that the soils contain genetic Gypsic, Salic, and Calcic layers in some target profiles. Taxonomy technique could not identify and separate them so it was discarded in the classification process. Therefore, the real condition of the environment was not revealed using this technique. This shortcoming can have influence on the real distribution of the type soils (soil plans) in the region. Since there is a huge distribution of such soil types in the region and probably in central regions in Iran as well, so there is a need to revise the existing classification of soils in the arid lands. To have a more efficient classification and based on the findings of this study, an extra suborder and subgroup in Arid Solos category are suggested. For a better taxonomy of these soils a great group called as Gypsisols is added to solids suborder. In this subgroup, a Calcic layer which did not accompany Gypsic and Salice types in American Taxonomy is included here. So these soils categorized in Aridisoil order, Salids suborder, Gypsi-salids great group and Calcicgypsisalids sub great group. The real pattern of their distribution would be revised by introducing a new soil type among the separated types in the region.

Keywords: American Taxonomy, Calcicgypsisalids, Sub Great Group, Central Iran.

INTRODUCTION

Although the soil studies in different countries follow a same pattern, they are based on different categorizations. Some classifying principles are unique to some specific countries and they classify and draw maps based on it. There are two international methods which countries use based on their choices. There methods are called FAO and American. American method is employed in Iran and FAO is used as a coordinator.

- **Soil Classification**

The living things are classified in order to facilitate the understanding of their features and their relations and also to sum up the human knowledge. This would facilitate the process of using creatures and the phenomena as well. The ultimate goal of classifying soil is to meet the human desires and to carry out the exploitation of the earth[1]. American Taxonomy and FAO are mainly used throughout the world. The process is done based on the factors included in both. Based on American Taxonomy Model, there are 12 classes. Ecological characteristics are regarded here, but in FAO the formation, evolution and morphology processes are the priorities to carry out the classification. In FAO the regional ecology is not regards as a factor in classifying the soil types. In Iran this method is used as a sort of coordinator. The soils belonging to arid lands are known as Aridisols based on American Taxonomy method. These soils have a thermic moisturizing regimen. They are identified by a bright surface layer in which there are a little organic minerals, gypsum, lime, and clay. Sometimes there are soluble salts and sodium ions which are transferred to the depth of soil. Thus, the soils containing genetic layers of soluble salts, calcium carbonate, gypsum and silicon in which there also cemented and non cemented layers on the surface are known as Aridisol type[2]. In a study carried out on arid soil by Naghavi in Rafsanjan, the existing soils were put into arid sol category based on their physical -chemical and morphologic processes in the dug profiles. He classified them as being Leptic Haplogypsids, Gypsic

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Haplogyspsids,and Typic Torrifluvent [3]. Seivandi Nasab in a study done in Neiriz plain in Fars revealed that these soils contain termic, arid, moisturizing, and heating regimen in which lime and gypsum layers existed. He therefore put them into Aridi Sols Class based on American Taxonomy [4]. Mojiri conducted a study on Sagzi plain in eastern Isfahan revealed that the soil belongs to Gypsic Haplocalcids sub order and Arid Sol order based on Taxonomy model[5]. Al-Qudah did a study in Jordan showed that about 60 percent of the soils are from calcic, Gypsic, Cambic and Salic type and categorized them using Taxonomy Model[6]. The soils are categorized based on the genetic feature they have. The ability to categorize them is based on their potentials and also considering their genetic features. A qualitative promotion of each method needs revision and an increase of classifying units through the time. It is not long time ago that the American Taxonomy model included 10 or 12 more units and has gone through changes, revisions, and annual increasing. The studied soils in this research belong to arid type. Common taxonomy model cannot classify them efficiently since these soils contain salic, gypsic, and calcic layers for which there is no place in American Model. Contrary to American Taxonomy model, FAO enjoys more flexibility because of its inventory of defined prefixes and suffixes. So there is a possibility of a correct categorization of new soil types.

- **Objectives of the Study**

Introducing a type of soil with unique features and a vast distribution and giving a new category for it without using Common Taxonomy Model.

MATERIALS AND METHODS

- **Region under the study and its climate**

New and old parts of the mountain foot located in western part of Hasanabadolia. It is 7789 hectares. It is 1900 meters above the sea level which varies to 1500 meters in the northern parts in Rizab Mountains. Based on Iran's bioclimatic map which is extracted from in a book called Iran Climate by Gousan and Ambroje. This region is known as a semi arid land (based on Gousan) and dry cold (based on Ambroje). Based on domarton's classification, it is a severely cold and dry land. The amount of annual rainfall is less than the amount of evaporation and its moisturizing regimen is known to be arid. The average temperature is $15.58^{\circ c.}$ In case of an increase as much as one degree increases in temperature, the heat in 50 cm depth would reach 16.58. The average soil temperature is more than $15.6^{\circ c}$ and less than $22^{\circ c}$ its heat regimen is known as thermic.

- **Separating the land units**

Aerial photos were interpreted using Stereoscope after attaching transparent talc. This interpretation was done based on geomorphic viewpoint and 4 levels of geopodology devised by Zinc [7]. In this phase, land units, litology, land form and patterns were all sketched on the images. A guideline of land units was also prepared. The talc and photos were scanned and edited using Elvis software. After that the photos and talc were referred to Earth–Photo reference suit. Finally, numerical values were added based on Zinc 4 levels. In other words, a land distribution pattern was sketched.

- **Sampling**

The sample spots were sketched in form of a network of the region under the study in each drawn geomorphic unit. They were 500 to 1000 meters away from each other. The spot under the study was identified on the land using a locator and coordinates. Digging was carried out. About 120 spots were dug and interpreted. Hydrologic and morphologic features of the layers including color, texture, structure, resistance, and order of the levels were all identified. A sample of genetic layers was taken to the lab.

- **Physical and Chemical analysis**

Electrical Conductivity (EC) and Soil Reaction (pH) of all the samples were determined. The texture of some samples was calculated using pipette Method.

- **Separating Soil Series in the Region**

Some of the data in the research is from soil studies in Hasan Abad[8]. Based on the physical features like slope, relief, and erosion of soils the experimental levels were interpreted. The soil was also classified using American Taxonomy Model and FAO. Nine different series and a hidden phase were all identified. The distribution pattern was also sketched using index interpolation by Elvis software.

- **Identifying New Soil and its Distribution Pattern**

Among the dug spots about 9 spots are regarded as placebo. Full chemical and physical analysis was conducted on the samples extracted from the placebo spots. Then the parts in which genetic gypsic, calcaic and salice layers exist were all identified. It turned out that American Taxonomy Model cannot identify them and their full genetic features cannot be considered. The distribution pattern was also sketched using index interpolation in Elvis software. Then a method was suggested for categorizing them based on American Taxonomy Model. In this condition adding great group to sub order and a sub great group to greatgroup was recommended as well.

RESULTS AND DISCUSSION

- **Soil studies**

Regarding the physical appearance of the land, its forming substances, profile features like index, color, texture, structure, concentration of salt, lime, gypsum, the existence of heat and moisturizing regimens and lab finding, the soils were categorized based on the ultimate edition of American Taxonomy and FAO.
Based on the region under the study, the soils are put into Entisols and AridiSols categories:
A) Young Soil: Entisols: there is no profiled evolution except for Ochric. There are some instances of this large category in the area.
1) Loamy –Skeletal, Mixed, Thermic: they enjoy the features of Entisols. They have a moisturizing regimen in which organic materials reduces regularly as the depth decreases. It reaches less than 0.2 percent in the places that are 125 centimeters deep. This big class has a branch in the area.

Series Number	sub great group	Soil Family
No 1	**Typic Torriorthents**	**loamy,skeletal,Mixed,termic**

B) Arid soil: Aridisols: they have arid moisturizing, and thermic heating regimen. They have salic features (a mass of salt), Gypsic (a mass of gypsum) and calcic (a mass of lime). There are some branches in this area:

Series No	sub great group	Soil Family
2	**Typic Haplocalcids**	**Loamy Skeletal carbonated thermic**
3	**Calcid haplsalids**	
4	**Typic Calcigypsids**	

2) Loamy – Skeletal, Gypsic, Thermic: they have the features of Aridsols and contain layers of gypsic , and soluble minerals in the depths of the profile. They as follows:

Series	sub great group	Soil family
5	**Gypsic Haplosalids**	**Lomay- skeletalGypsic Thermic**

3. Fine – Loamy, Carbonated, Thermic
They enjoy the general features of Aridsols. There is a concentration of lime and soluble minerals in the depths of 100 centimeters.

Serise Number	Sub great group	Soil family
6	Gypsic Haplosalids	Fine-loamy, Gypsic, Thermic
7	Typic Haplogypsids	
8	Typic Calcigypsids	

Series number	sub great group	soil family
9	Calcic Haplosalids	Fine- Loamay-Carbonatic-

(Table 1) Classification and coordination of the soils under the study

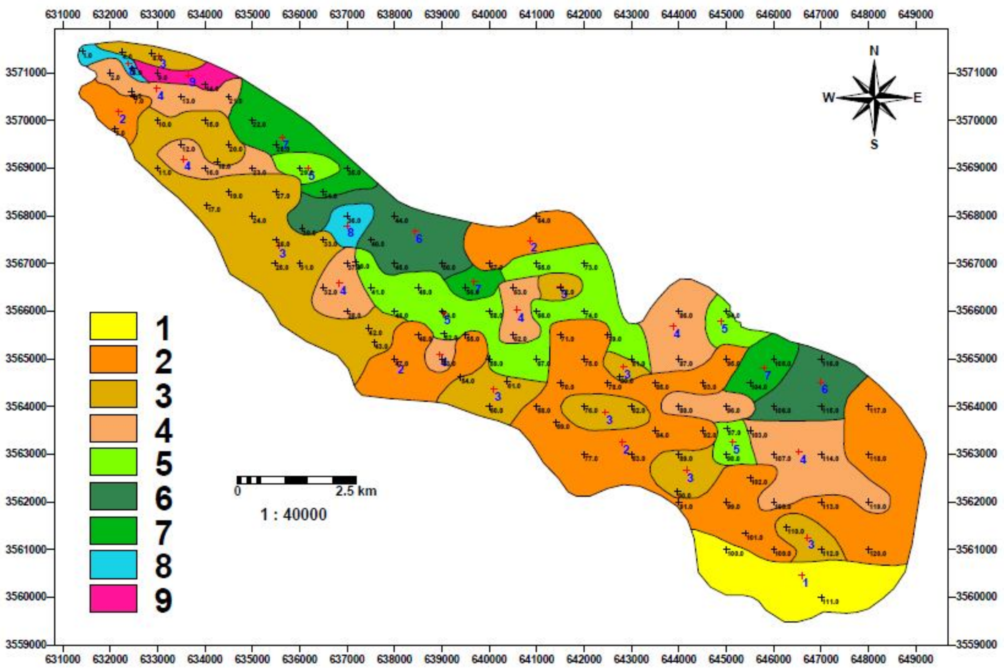
Physiography	**Keys to U.S.D.A Soil Taxonomy (2011)**		**FAO (2006)**	**Soil Series**
	Soil Family	**Sub groups**		
Pebble containing alluvium from the mountain slope	Loamy -skelelal, Mixed, Thermic	Typic Torriorthents	Haplic Arenosols	1
Alluvium from mountain slopes containing evolved pebbles and also fromhigh plateau	Loamy-skeletal, Carbonatic, Thermic	Typic Haplocalcids	Haplic Calcisols	2
		Calcic Haplosalids	Endosalic Calcisols	3
		Typic Calcigypsids	Gypsic Calcisols	4
	Loamy-skeletal, Gypsic, Thermic	Gypsic Haplosalids	Gypsic Solonchaks	5
	Fine-loamy, Gypsic, Thermic	Gypsic Haplosalids	Gypsic Solonchaks	6
		Typic Haplogypsids	Haplic Gypsisols	7
		Typic Calcigypsids	Gypsic Calcisols	8
	Fine-loamy, Carbonatic, Thermic	Calcic Haplosalids	Endosalic Calcisols	9

Introducing a new type of soil

After doing the physicochemical experiments on the dug profiles in the region, it turned out that there are some features for which there is no exact equivalent in American Taxonomy and the current classification cannot express the existing genetic features of the soil. American Taxonomy model can classify the soils containing lime, gypsum, and salt, but since these soils have all genetic gypsic, salic, and calcic features together, a true classification is not possible. Since there is no class for such a soil with all three genetic features in the newest edition of American Taxonomy model, this soil can be put in a new class in the international system. Table 2 shows the profiles that contain the mentioned feature in the region. As it is obvious, about 25 percent of the whole studied spots are rich in this soil type.

(Table 2) Series and location of the profiles containing calcic , gypsic , and salic layers

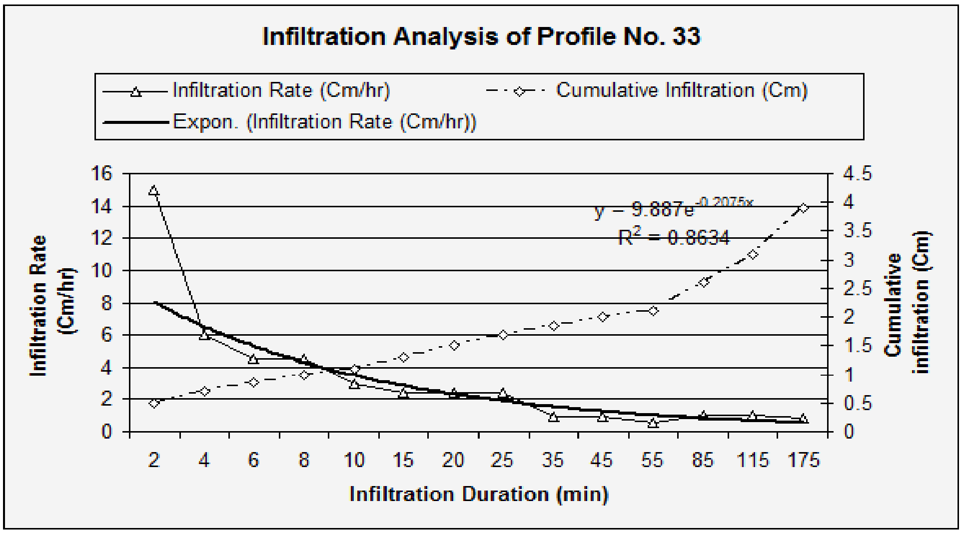
Y	X	profile	Series	Y	X	Profile	Series	Y	X	Profile	Series
3566500	641500	72	3	3566500	638500	49	5	3571000	633000	9	**9**
3567000	642000	73	5	3566000	639000	51	5	3570000	633000	10	**3**
3564617	642754	80	3	3565530	639046	52	5	3569000	633000	11	**3**
3565000	643000	81	5	3566000	640000	58	5	3569133	634256	18	**3**
3564000	644000	88	3	3564000	640000	60	3	3567500	635500	26	**3**
3564000	645000	96	3	3564529	640374	61	3	3567000	636000	31	**3**
3563544	645016	97	5	3567000	641000	65	6	3567500	636500	33	**3**
3563000	646000	107	4	3566000	641000	66	5	3567023	637180	39	**5**
				3565000	641000	67	5	3565643	637450	42	**3**



(Fig. 1) Map of location of different separated soil series in the region under the study and dug spots in each of these series

- **Morphological features of the new soil**

It is deep and its color sways between pink, blurred yellow and brown. It has a heavily dense texture (Clay Loam). It contains 0 – 15 percent of fine sand particles with a pressed structure and high salinity (AZ). There is a texture which is blurred brown and has a dense texture (Sandy Clay Loam). It is very saline with a pressed structure which contains about 35 – 75 percent of pebbles. There are many stains pertaining to the secondary type of lime (BKZ). The rate of water permeability into the soil equals 1 centimeter per hour. Since it belongs to III series, the surface irrigation would not be efficient (Diagram 1). The rate of water passing through the soil equals 0.23 centimeter per hour which is indicative of its slow water passing pace. The water would not be wasted using surface watering system. The location specifications for the placebo profile no 33 are brought in table number 2.



(Fig. 2) Curve of water infiltration from the surface into the soil through the time accompanying its pace equation.

Table 3 shows morphologic features for profile number 33. The morphologic features of the genetic layers of new soils are as the following:

Specifications	Type
It is pink and dark grey (10 yr6/4) when it is dry. It turns to brown (10yr4/4) when it is wet and has a dense texture (Clay Loam). It is pressed and contains 15% fin sand particles and a great deal of lime which is thinly populated. There is a vacuum place. They are pretty resistant when dry and totally hard when wet. It is sticky and formable when it is wet. The distance from the beneath layers is clear and wavelike.	**Az 0-20 cm**
It is light brown (7.5yr5/4) when dry and dark brown (7.5Yr4/4) with a heavily dense layer (Sandy Clay Loam) accompanying a pressed structure and 50 percent of pebbles and secondary type lime in form of powder like bags. There is also vacuum and pores. When it is complexly dry, it shows a great resistance and at the times it is wet it is a bit hard. There is a gradual and wavelike distance from the beneath layers.	**Bkz 20 – 55 cm**
It is blurred yellow (10yr7/4) when it is wet. It turns to pink (10yr6/4) when dry. When it is wet there is a dense layer of sandy clay loam, pressed structure with about 30 percent of pebbles and a lot of gypsum crystals are seen between the soil particles, beneath the pebbles and there are pores both big and numerous. It is a bit tough when it is dry. It is hard when it is wet. It is sticky and formable when it is wet.	**Byz 55 –140 cm**

(Table 3) Morphological properties of the profile no 33.

Profile	Type	Depth	Color when it is wet	Structure	Wet stability	Border	Pebbles	Other Specifications
	Az	20-0	10YR4/4	Mass	fr	gw	%15	3,M,vf,f,d,r
33	Bkz	55-20	7.5YR4/4	Mass	fr	gw	%50	2,M,vf,d,r-1,F,m,d,r
	Byz	140-55	10YR6/4	Mass	vfr		%30	1,F,f,d,r,-1,M,c,c,r

The abbreviations and symbols are based on Soil Survey Manual (2003).

- **General features of the soil in the region under the study:**

1: Sandy clay loam, 2-5% slope, extremely saline: (Sandy loam – Sandy clay loam): it has the features of the main soil. It has a thin surface layer. It contains about 0 to 15 percent of pebbles on its surface. In its depth there is about 35 – 75 percent of pebbles. Its slope equals 2 – 5 percent. Its side slope is 1 – 2 percent. It is very flat and high, saline, erosive and very alkaline. It is put into class 6 (VIA). There is a serious limitation for its salinity and alkalinity. It is used as a rangeland. It is 463.2 hectares wide.

2: Sandy clay loam, 2-5% slope, highly saline: (Sandy loam – Sandy clay); it has the features of the main soil. It has a thin surface layer. It contains about 0 to 15 percent of pebbles on its surface. In its depth there is about 35 – 75 percent of pebbles. Its slope equals 2 – 5 percent. Its side slope is 1 – 2 percent. It is very flat and high, saline, erosive and alkaline. They are put into class 5 (VIA). There is a serious limitation for its salinity and alkalinity. It is used as a rangeland. It is 162.5 hectares wide.

3: Silty clay, 5-8% slope, highly saline: (Silty clay): it has the features of the main soil. Its surface layer is so dense. It contains about 0 to 15 percent of pebbles on its surface. In its depth there is about 35 – 75 percent of pebbles. Its whole slope is 5 – 8 percent. Its side slope is about 1 – 2 percent. It is very flat and high, saline, and alkaline. It has a high erosion level. They are put into class 5 (VA). There is a serious limitation for its salinity and alkalinity. It is used as a range land. It is 58.9 hectares wide.

4: Sandy loam, 0-2% slope, moderately deep, extremely saline: (Sandy loam – Sandy clay loam): it has the main features of the target soil. It's thin to thick. It depth has about 35 – 75 percent of pebbles and on surface it is about 0 – 15 percent. There is a blocking layer made of gypsum in the 60 centimeter depth. Its whole and side slope equals 1 – 2 percent. It is not much high or flat, but very erosive, saline, and alkaline. It belongs to class 6 (IVT) there is a serious limitation for its salinity and alkalinity. It is currently used as a range land. It equals 132.5 hectares wide.
5: Sandy, 0-2% slope, highly saline: (Sandy): it has the main features of the target soil. Its surface level is thick. It depth has about 35 – 75 percent of pebbles and on surface it is about 15 – 35 percent. Its whole and side slope equals 1 – 2 percent. It is not much high or flat, but very erosive. It belongs to class 5 (VA) there is a serious limitation for its salinity and alkalinity. It is currently used as a range land. It equals 50.8 hectares wide.
6: Sandy loamy, 5-8% slope, moderately saline: (Sandy loam): it has the features of the main soil. It has a thin surface layer. It contains about 15 to 35 percent of pebbles on its surface. In its depth there is about 35 – 75 percent of pebbles. It is highly saline and alkaline. Its whole slope is 5 – 8 percent and its side slope is 1 – 2 percent. It is very flat, high, and erosive. It belongs to category number 4 (IVT) due to its serious limitation for erosion. Now it is used as a range land. It is 48.1 hectares wide.
7: Clay loam, 2-5% slope, extremely saline: it has the main features of the target soil. Its surface layer is both thin and thick (Clay loam). In its depth there is about 35 – 75 percent of pebbles. There is about 0-15 percent of sand on its surface. It's very saline and alkaline. Its whole and side slope equals 2 – 5 percent. It is put into class 6 (VIA). There is a serious limitation for its salinity and alkalinity. It is used as a range land. It is 377.4 hectares wide.
8: Sandy loamy, 2-5% slope, moderately saline: it has the features of the main soil. It has a thin surface layer. It contains about 15 to 35 percent of pebbles on its surface. In its depth there is about 35 – 75 percent of pebbles. It is salinity and alkalinity is average. Its whole slope is 5 – 8 percent and its side slope is 1 – 2 percent. It is very flat, high, and erosive. It belongs to category number 3 (III) due to its average limitation for erosion and soil texture. Now it is used as a range land. It is 146.6 hectares wide.
9: Sandy loam, 2-5% slope, highly saline: (Sandy loam): it has the features of the main soil. It has a thin surface layer. It contains about 35 to 75 percent of fin sand particles on its surface. In its depth there is about 35 – 75 percent of pebbles. It is salinity and alkalinity is average. Its whole slope is 2 – 5 percent and its side slope is 1 – 2 percent. It is very flat, high, and erosive. It belongs to category number 5 (VA) due to its serious limitation for salinity and alkalinity. Now it is used as a range land. It is 106.5 hectares wide.
10: Sandy loamy, 2-5% slope, moderately saline: (Sandy loam): it has the features of the main soil. It has a thin surface layer. In its depth there is about 35 – 75 percent of pebbles and on surface it is about 15 – 35 percent. Its salinity and alkalinity is average. Its whole slope is 2 – 5 percent and its side slope is 1 – 2 percent. It is very flat, high, and erosive. It belongs to category number 3 (IIIST). There is a serious limitation for erosion and soil texture. Now it is used as a range land. It is 80.3 hectares wide.
11: Clay loamy, 5-8% slope, moderately saline: (Clay loam). It has the main features of the target soil. Its surface layer is thick. It contains about 35 – 75 percent of pebble on its surface and depth. Its alkalinity and salinity is medium. Its whole slope equals 5 – 8 percent and the side slope equals 1 – 2 percent. It is not much high or flat, but very erosive. It belongs to class number 4 (IVST). There is a serious limitation for erosion and soil texture. Now it is used as a range land. It is 35.6 hectares wide.
12: Sandy loamy, 0-2% slope, highly saline: (Sandy loamy): it has the features of the main soil. It has a thin surface layer. In its depth there is about 35 – 75 percent of pebbles and on surface it is about 15 – 35 percent. Its salinity and alkalinity is high. It's both whole and side slope is 1 – 2 percent. It is very flat, high, and erosive. It belongs to category number 5 (VA). There is a serious limitation for salinity and alkalinity. Now it is used as a rangeland. It is 69.5 hectares wide.

Physical and Chemical Features of the new soil type:

The genetic layers belonging to placebo profile were analyzed and the findings are in table number 4.

(Table 4) The comprehensive findings of physical and chemical experiments conducted

		Particle Size Classes (mm)				**Texture**	**SP**	**dS/m ECe×10^3**	**PH**	**OC %**
Depth (cm)	Horizon	Sand 2-0.05	Silt 0.05-0.002	Clay <0.002	Gravel >2					
0-20	A	43.6	17.4	39	15	Cl	39	25.7	7.4	**0.001**
20-55	Bkz	67.6	5.4	27	50	Scl	38	46	7..2	**0.34**
55-140	Byz	49.6	25.4	25	30	Scl	37	124.3	6..9	**0.21**
					Gypsum	Ex.Na	C.E.C			
Depth (cm)	Total N %	Ava.P mg/kg	Ava.K mg/kg	T.N.V %	meq/100g Soil			ESP	SAR	**BS %**
0-20	0.0001	3	150	38.5	33	5.75	12.5	46	36.5	**100**
20-55	0.03	1.6	140	56	19	3.75	6.5	57.7	43.7	**100**
55-140	0.02	-	-	50	28	6.85	11.5	59.5	84.5	**100**
	Soluble Cations (meq/l)					**Soluble Anions (meq/l)**				
Depth (cm)	Ca^{++}	Mg^{++}	Na^{+}	K^{+}	Sum	$CO3^{--}$	$HCO3^{-}$	Cl^{-}	$SO4^{--}$	**Sum**
0-20	63		205	-	268	-	3	212	52	**267**
20-55	135		359	-	494	-	3	386	10	**493**
55-140	322		1072	-	1349	-	2.4	1190	100.6	**1393**
	Water Content %						**Permeability**		**Infiltration Rate**	
Depth (cm)	Field Moisture (F.M)	Fc 33kp	Wp k1500	B.D gr/cm^3	PD gr/cm^3	Total Porosity %	cm/h	Class	cm/h	**Class**
0-20				1.7	2.8	37	0.35	2-3	1	**III**
20-55				1.8	2.85	72	0.013	2-3		
55-140				1.65	2.5	83	0.22	2-3		

As it can be seen in table no 4, these soils have a quite pressed structure. The surface layer contains dispersed masses of lime. The beneath layers are in form of secondary type lime which are packed like powder bags. The most concentration is in the second layer. It is indicative of their weak permeability. There are gypsum crystals between the soil particles and beneath the pebbles too. The most concentration of gypsum is in their surface layers which is also indicative of their weak permeability. These soils are very saline and the amount of the salt is the greatest in their depth. Having analyzed the placebo profiles, it was determined that they contain gypsum, lime and salt altogether. There is no name for them in American Taxonomy model (2011). The classification of the new soil types based on Current version of American Taxonomy (2011) is as the followings. These soils belong to Arid sols order, salids sub-order, haplosalids great group and gypsic haplosalids subgreat group . Their genetic features which are in line with calcic Type are not included in this classification.

(Table 5) Classification of the new soil type based on the current version of Taxonomy

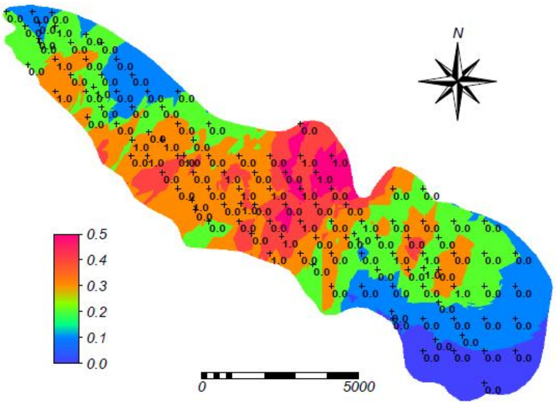
Order	**Sub-order**	**Great group**	**Subgreate group**
Aridisols	Salids	Haplosalids	GypsicHaplosalids

So the existing classification for them in American Taxonomy is not a complete one since the process during which they turned into calcic is not included. A new classification has to be proposed. It is recommended that a new great group called Gypsisalids be added to main groups which are sub order of Solids (Aqua Solids and Haplo Solids). This new group can include calcic layer in its minor sub categories. The new proposed classification is this:

(Table 6) Proposed classification for the new soil type in the region

Order	**Sub-order**	**Great group**	**Subgreate group**
Aridisols	Salids	Gypsisalids	Calcic Gypsisalids

In international communities the focus is on distribution and extension of the soil, so that it can be used as an acceptable correction for the taxonomy. If it enjoys a wide distribution and extension, it will be accepted quickly. So to reveal its vast distribution in the regional profiles containing the features of the new found soil type, an index has been used to extract and estimate its covering area. Map no 2 reveals its distribution in the region. Based on this map, its vast distribution is in the center of the region under the study. Considering the map, the areas in which the new soil is thought to exist (with 35% or more percent of likeliness) are colored pink, red, and orange. These areas are regarded as its distribution pattern which covers about 2000 hectares (total area regarding its various forms).



(Fig 3) map of Distribution pattern of new class of soil in the region
(zero indicates its non existence and 1 indicates its existence)

Conclusion

Having done this study, it was determined that taxonomy systems are still used worldwide to classify the soil types. These systems cannot classify some of the types existing in the region. It is recommended that a new great group known as GypsiSolids be added to Solids sub order so that theses soils can be classified using American Taxonomy model. Since the new soil has appeared in the great groups existing in this area, there is a possibility of finding new series. It seems a change in soil map and increases in these series are inevitable. Regarding soil and new series, the mode of soil distribution is likely to change.

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